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Paola Cessi
Scripps Institution of Oceanography
University of California at San Diego
Mail Code 0230
La Jolla, CA 92093-0230

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Defense Technical Information Center
Building 5, Cameron Station
Alexandria, VA 22304-6145

RE: N0001492-J-1364

To Whom it may concern:

enclosed you will find a brief report on the results obtained in the first year of the grant N0001492-J-1364. The report is essentially the abstract of a paper with G.R. Ierley which is now accepted for publication on the Journal of Physical Oceanography.

Sincerely

Progress Report for Grant N0001492-J-1364

SEPARATION OF WESTERN BOUNDARY CURRENTS

by

Paola Cessi (Principal Investigator)
Scripps Institution of Oceanography
University of California at San Diego
La Jolla, CA 92093-0230
Telephone: (619) 534-0622; email: cessi@dalek.ucsd.edu

The first year of the above named project ran from March 1st, 1992 to September 30, 1992 and the funding for this period was about $33,000.

The long term goal of the project is to contribute to the understanding of western boundary current separation. Our approach is to study simple process models which isolate physical mechanisms.

To date we have taken the point of view that western boundary current separation can be induced by the breakdown of laminar flows due to time-dependent instabilities. This conjecture has lead us to propose viscous shear instability of steady boundary currents as a primary mechanism for generating time dependent eddies at western boundaries.

Thus we have examined the stability of the Munk current with constant transport flowing along a straight coast, tilted at an angle with respect to the north-south direction. We have calculated various properties of the marginally unstable wave as a function of the tilting angle, such as the critical Reynolds number and the phase and group velocities. We have also examined the effects of weak nonlinearity and have found that the instability is supercritical for the whole range of tilting angles examined. Thus the marginally unstable mode can equilibrate at a small finite amplitude and we derive the equation governing its slow evolution. The flow that results after the disturbance has equilibrated to finite amplitude is in agreement with the eddying boundary currents obtained in many wind-driven general circulation models.

The results of the study summarized above are detailed in a scientific paper entitled *Nonlinear disturbances of western boundary currents* by Paola Cessi and Glenn R. Ierley. The article has been accepted for publication on the *Journal of Physical Oceanography.*